43. (Amended) An isolated nucleic acid molecule that hybridizes to a nucleic acid molecule encoded by SEQ ID NO: 31 under the following conditions: 7% SDS, 0.5 M sodium-phosphate buffer at pH 7.2, 1 nM EDTA, pH 8.0 and 55° C, wherein the nucleic acid molecule encodes an amino acid sequence having odorant receptor activity.

44. (Amended) An isolated nucleic acid molecule that hybridizes to a nucleic acid molecule encoded by SEQ ID NO: 31 under the following conditions: 7% SDS, 0.5 M sodium-phosphate buffer at pH 7.2, 1 nM EDTA, pH 8.0 and 65° C, wherein the nucleic acid molecule encodes an amino acid sequence having odorant receptor activity.

**REMARKS**

The Office Action dated March 12, 2002 has been carefully reviewed and the following remarks are made in response thereto. In view of these remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

**Response to the Examiner's withdrawal of claims**

The Examiner contends that claim 37-42 are draw to an independent and distinct invention. Applicants respectfully disagree. However, in the interest of furthering prosecution claims 37-42 have been canceled.

**Response to the rejection under 35 U.S.C. 101/112 first paragraph**

Claims 27-44 were rejected under 35 U.S.C. 101 because the claimed invention is purportedly not supported by a specific and substantial asserted utility nor a well established utility.

The Examiner contends that the specification contains no disclosure of the biological role or significance of the protein encoded by the claimed nucleic acid sequence and that because of alleged inherent errors in sequence to function methods of assigning protein function one of ordinary skill in the art would not appreciate why the instant invention is useful.

As explained in detail in the specification and in the response of December 31, 2001, Applicants have clearly established the odorant receptor function for the claimed sequence and that odorant receptors have patentable utility *inter alia* for the identification of agents which modulate odorant receptor activity, as antigens to raise antibodies against the receptors, and in methods to modify insect behavior as set forth in the specification (see, *e.g.*, summary of utility on page 15, lines 25-28).

The specification clearly establishes the biological function of the odorant receptor family disclosed in the instant application (see, *e.g.*, pages 1-3) and that nucleic acid SEQ ID NO: 31 is a member of this family (see, *e.g.*,page 58 line 16 through page 59, line 9). The Examiner's contention that sequence to function methods of assigning protein function are inaccurate is misplaced. On page 5 of the specification the Applicant clearly indicates that the gene family of the instant invention was identified using computer programs that identify diagnostic features of protein **structure**. Thus, each of the references cited by the Examiner are not relevant in any discussion of function of the disclosed gene family. In particular the Doerks reference is drawn to the pitfalls of relying on the annotations provided by scientists when they submit sequences to databases. Furthermore, the portion of the reference that the Examiner relies upon (pg. 248, column 3, paragraphs 4 and 5) does nothing to further the Examiner's position regarding the instant invention. This portion of the reference merely points out the fact that many of the annotations found in databases are not accurate, and that another type of error in assigning function to proteins occurs when the query region of the protein is independent from the region upon which the annotation is based. With regards to the statements on pg. 250 of the reference cited by the Examiner, the Examiner is once again reminded that the family of genes of the instant invention were identified through structural similarity and that the Applicant does not rely on sequence similarity as a means of the identifying the odorant receptor gene family of the instant application. The family of odorant receptor genes identified by the Applicant is large and clustered as are other previously identified odorant receptor families. The genes identified as odorant receptors are expressed in one or both of the olfactory organs. Furthermore, the disclosure on pp. 58-59 provides that the protein encoded by SEQ ID NO 31 is expressed in the exact location where one would expect an odorant receptor to be.

The Examiner correctly identifies "preponderance of the evidence" as the proper standard to apply when determining if an invention has utility. In this instance, the Examiner has not put forth any relevant evidence regarding a lack of utility. As such the preponderance of the evidence clearly proves that one of ordinary skill in the art would immediately recognize the utility of the instant invention and be well aware of how to use the instant invention. Thus, in light of the aforementioned remarks, Applicants respectfully request that the rejection be withdrawn as it applies to the pending claims.

**Response to the rejections under 35 U.S.C. 112 (first paragraph)**

Claims 27-35 were rejected under 35 U.S.C. 112, first paragraph, because the specification purportedly is not enabling for a nucleic acid encoding a fragment of a *Drosophila* odorant receptor protein.

The Examiner contends that claim 27 does not contain a functional limitation and as such the specification fails to provide the guidance that one of ordinary skill in the art would need in order to make or use the claimed invention.

The specification provides multiple representative examples of nucleic acids encoding an odorant receptor protein fragment (see page 17, line 28 through page 18, line 17). In addition, one skilled in the art can use well-established protocols to test whether a claimed fragment has odorant receptor activity. Furthermore, claim 27 has been amended to more clearly indicate that the amino acid sequence encoded by the claimed nucleic acid sequences has odorant receptor activity. As such, one skilled in the art at the time of filing would be able to make and use the invention of the instant claims.

Claims 43-44 were rejected under 35 U.S.C. 112, first paragraph for purportedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors had possession of the claimed invention. The Examiner contends that the specification and claims do not indicate what distinguishing attributes are shared by the members of the claimed genus.

The specification provides full support for the family of odorant receptors identified by the Applicant. One of skill in the art would immediately recognize that the Applicants had possession of the family of *Drosophila* odorant receptors at the time of filing. Furthermore,

claims 43-44 have been amended to more clearly indicate that odorant receptor activity is an attribute of the claimed invention. Given the amendments to the claims and the disclosure of the specification, one of skill in the art would clearly know that the Applicant was in possession of a family of odorant receptor genes and that claims 43-44 encompasses a subset of this family.

**Response to the rejection under 35 U.S.C. 112 (second paragraph)**

Claim 27-35 are rejected under 35 U.S.C. 112, second paragraph, as purportedly being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. The Examiner contends that SEQ ID NO: 31 is a cDNA and therefore cannot comprise an exon-intron boundary.

Claim 27 has been amended and no longer includes a reference to an exon-intron boundary. As such, the rejection under 35 U.S.C. 112, second paragraph is moot. Thus, in light of the aforementioned amendments and remarks, Applicants respectfully request that the rejection be withdrawn as it applies to the pending claims.

**Response to the rejection under 35 U.S.C. 102(a)**

Claims 27-35 and 43-44 were rejected under 35 U.S.C. 102(a) purportedly for being anticipated by Celniker *et al.* (1998) (GenBank Accession No. AC004121). The Examiner contends that this reference discloses a nucleic acid sequence that would hybridize to the sequences of the instant invention under conditions to produce a clear signal and thus, given the purported indefinite nature of claim 27, anticipates claims 27-35 and 43-44.

Claim 27 has been amended and no longer contains the terminology which purportedly rendered the claim indefinite. Furthermore, none of the rejected claims are directed to nucleic acid molecules which would hybridize under conditions to produce a clear signal. As such, applicants respectfully submit that the cited art does not disclose all of the limitations of the pending claims because it does not disclose SEQ ID NO: 31, nor an open reading frame, nor a fragment of at least 25 consecutive amino acids encoded by SEQ ID NO: 31, nor host cells comprising the nucleic acid sequence of the instant invention, nor nucleic acid sequences encoding amino acid sequences having odorant receptor activity. Therefore, Celniker *et al.* does

not anticipate claims 27-35 or 43-44. Applicants respectfully request that the rejection be withdrawn.

**Conclusion**

The foregoing amendments and remarks are being made to place the application in condition for allowance. Applicants respectfully request reconsideration and the timely allowance of the pending claims. A favorable action is awaited. Should the Examiner find that an interview would be helpful to further prosecution of this application, he is invited to telephone the undersigned at his convenience.

If there are any additional fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

**MORGAN, LEWIS & BOCKIUS LLP**

Date: July 11, 2002 By: 

Erich E. Veitenheimer
Reg. No. 40,420

CUSTOMER NO. 09629
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Avenue, NW
Washington, D.C. 20004
202-739-3000

## VERSION WITH MARKINGS TO SHOW CHANGES MADE

**IN THE CLAIMS**

Claim 27 has been amended as follows:

27. (Amended) An isolated nucleic acid molecule that encodes the amino acid sequence of a *Drosophila* Odorant Receptor protein or fragment thereof, wherein the nucleic acid molecule comprises ~~[at least one exon intron boundry located in a position selected from the group consisting of]~~:

(i) nucleotides of SEQ ID NO: 31 which encode the amino acids which comprise the third extracellular domain;

(ii) nucleotides of SEQ ID NO: 31 which encode the amino acids which comprise the fourth extracellular domain; and

(iii) nucleotides of SEQ ID NO: 31 which encode the amino acids which comprise the fourth intracellular domain;

**wherein the nucleic acid molecule encodes a protein or fragment thereof which has odorant receptor activity**.

Claim 43 has been amended as follows:

43. (Amended) An isolated nucleic acid molecule that hybridizes to a nucleic acid molecule encoded by SEQ ID NO: 31 under the following conditions: 7% SDS, 0.5 M sodium-phosphate buffer at pH 7.2, 1 nM EDTA, pH 8.0 and 55° C, **wherein the nucleic acid molecule encodes an amino acid sequence having odorant receptor activity**.

Claim 44 has been amended as follows:

44. (Amended) An isolated nucleic acid molecule that hybridizes to a nucleic acid molecule encoded by SEQ ID NO: 31 under the following conditions: 7% SDS, 0.5 M sodium-phosphate buffer at pH 7.2, 1 nM EDTA, pH 8.0 and 65° C, **wherein the nucleic acid molecule encodes an amino acid sequence having odorant receptor activity**.